

Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Droplet Dispersion and Vapor Mixing by Fine Scale Turbulence

MAKOTO SATO, MAMORU TANAHASHI, TOSHIO MIYAUCHI, Tokyo Institute of Technology, 2-12-1 Ookayama, Meguro-ku, Tokyo 152-8550, Japan — Direct numerical simulations of evaporating droplet in homogeneous isotropic turbulence have been conducted to clarify the relationship between droplet dispersion and coherent fine scale eddies in turbulence. The dispersions of 10^6 droplets are analyzed for several initial droplet Stokes numbers. The Stokes number that causes specific distribution of droplets is closely related to the time scales of coherent fine scale eddies. The number density of droplet with particular Stokes number is low near the center of the coherent fine scale eddies and shows the maxima near the radius of the eddy. Comparisons between non-evaporating and evaporating cases suggest that the diameter change due to evaporation strongly affect the droplet dispersion around the fine scale eddies. The range of the specific Stokes number for evaporating droplets is wider than that of non-evaporating droplets, which causes particular vapor concentration fluctuation in turbulence.

Mamoru Tanahashi
Tokyo Institute of Technology

Date submitted: 04 Aug 2005

Electronic form version 1.4